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110403**PROVISIONAL APPLICATION FOR PATENT COVER SHEET**

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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INVENTOR(S)		
Given Name (first and middle if any)	Family Name or Surname	Residence (City and either State or Foreign Country)
Stewart A. Robert R.	Burton Hellman, Jr.	Milford CT Oxford CT
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto		
TITLE OF THE INVENTION (280 characters max)		
MULTIPURPOSE LIFTING TOOL		
Direct all correspondence to:		CORRESPONDENCE ADDRESS
<input checked="" type="checkbox"/> Customer Number	21091	<input type="text"/> → Place Customer Number Bar Code Label here
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<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76		
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT		
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.	FILING FEE AMOUNT (\$)	
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees		
<input type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: <input type="text"/>	80.00	
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.		
<input checked="" type="checkbox"/> No.		
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Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME John H. Crozier

TELEPHONE (203) 375-9118

Date 11/04/03

REGISTRATION NO.  
(if appropriate)  
Docket Number:

30,371

303-102

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This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

PATENT  
303-102

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re US Provisional Patent Application of )  
Stewart A. Burton et al. )  
Filed: Simultaneously herewith. )  
Title: MULTIPURPOSE LIFTING TOOL )

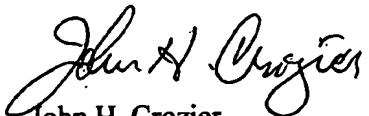
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Dear Sir:

I hereby certify that the above-identified provisional patent application is being deposited by me, postage prepaid, with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.110 on the date set forth above, addressed to Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.

Respectfully submitted,



John H. Crozier  
Attorney for Applicant  
Reg. No. 30,371  
1934 Huntington Turnpike  
Trumbull CT 06611-5116  
US  
Tel: (203) 375-9118  
Fax: (203) 378-8108

## **Multipurpose Lifting Tool**

### **1.0 Invention Overview**

The subject matter relates to a multipurpose lifting tool, the intent of which is to replace a number of common individual tools with a unique single device capable of efficiently executing a variety of tasks.

The new application for which invention is required is a single, safe, economical, device which can: lift and support a load via fork, surface, hook or container, be used to transport the load over a wide range of obstacles, and, when lifting is not required, provide a stable variable height worksurface including the means for securing a workpiece to same.

The multipurpose lifting tool can, in many instances, be used by the consumer to replace a hand truck, a lifting table, a portable workbench, a pallet jack, a hoist, a utility cart, and a wheelbarrow.

The multipurpose lifting tool is additionally practical in that it is: cost effective, requiring a minimum number of simple elements to achieve its purpose, capable of being folded, thereby requiring a minimum amount of space to transport or store, structurally efficient and therefore lightweight, thus promoting use in a variety of locations and by consumers of minimal physical strength.

### **2.0 Principle Components**

The principle components of the unit are the Column (1), Chassis (2), Front Wheels (3a), Rear Wheels (3b), Platform (4) Handlebar (5), Carriage (6), Drivetrain (7), and Column Support (8). The unit typically contains a Brake Mechanism (9), and Controls (10).

### **3.0 Principle Features believed unique, separately and/or in combination:**

#### **3.1 Column Purpose & Features**

The primarily purpose of the Column (1) is to support the Carriage (6) and thereby transmit the Platform (4) loads to the Chassis (2). A secondary purpose of the Column (1) is to retain and support the Handlebar (5) such that the operator can control the Unit. Additionally, the Column (1) guides the Carriage (6) over its entire operating range as well as encases and supports the Drivetrain (7) which lifts the Carriage (6). The Column (1) also contains features necessary for secure attachment of Load Straps (15) and in some cases Accessories such as Arms (16).

#### **3.2 Column Positions**

The Column (1) is rotatably mounted to the Chassis (2) such that it can be locked in either the Up position, for lifting, or Down position, for shipment, transport or storage.

With the Column (1) locked in the Up position, the unit is ready for use, which is typically done when the Front Wheels (3a) and Rear Wheels (3b) are in contact with the supporting surface such as the floor or ground. However, there may be instances, such as the loading of a cardboard box with individual or bulk-type items, where it is advantageous to lay the unit on its back. In this instance, the Rear Wheels (3b) and the Upper Column Ball Foot (11) serve as the contact points to the supporting surface.

With the Column (1) locked in the Down Position, the unit can be stored either horizontally on the Front Wheels (3a) and Rear Wheels (3b), or stored vertically. When stored vertically, the Unit contacts the supporting surface at the Rear Wheels (3b) and Lower Column Roller (12) which permits the Unit to be moved "sideways" easily, as may be required to facilitate storage in and retrieval from confined spaces such as closets. The unit can also be suspended for storage utilizing Hanger (13).

A Carry Handle (66) is provided such that the folded unit can be carried like a suitcase, as an alternate to simply towing it along.

### 3.3 Column Pivot

The Column (1) pivots about Pivot Point (14). It is a feature of this unit that pivoting can occur without damage to the Carriage (6) and without damage to the Brake Mechanism (9). In the embodiment shown, column, carriage, and brake systems share a common pivot point to enable this.

### 3.4 Column Preferred Embodiment

The preferred embodiment of the Column (2) is an aluminum extrusion (of constant section) with detail such that it can support the Leadscrew Sleeve (17), which in turn radially supports the Leadscrew (18), which is in turn axially supported by the Leadscrew Bearing (19). The extrusion contains surfaces which support the Carriage (6), as well as details which retain the Upper Control Housing (20). Since the extrusion is of fairly uniform wall and the carriage surfaces are interior features, it should be noted that the corresponding outer surfaces of the extrusion are similarly distinct and can be used to anchor Load Straps (15) as well as mount accessories such as Arms (16). Additional features can be easily incorporated into the extrusion's section, such as a Wire Track (21) and Brake Rod Cavity (22).

### 3.5 Chassis Purpose & Features

The primary purpose of the Chassis (2) is to provide a stable connection between the loaded Column (1) and the Front Wheels (3a) and Rear Wheels (3b).

A secondary function of the Chassis (2) is to aid maneuverability. The relatively narrow Unit width, coupled with Front Wheels as Casters (3c) permit easy navigation of hallways and doorways when the unit is upright and steered with the handlebar. Where enhanced stability is preferred over size, the forward portion of the chassis's Legs (27a) may be extended via the Leg Extensions (27b).

Structurally, the Receiver (23) and the established Pivot Point (14), at the distal ends of the Struts (33) locate the Column (1). The Column (1) is loaded into the Receiver (23) by the Latching Link (24), serving as a compression member, located between the Column (1) and the Rear Crossmember (25) of the Chassis (2), when the Column (1) is in the Up Position. The Latching Link (24) may serve as either a compression or tension member when the Column (1) is locked in the Down Position.

The Rear Crossmember (25), contains a Foot Pad (26), useful when the operator requires either assistance in tilting the Unit back, or adding his or her weight to the rear to prevent the unit from falling forward, as might occur in the case of lifting an overhanging load.

The rear of the Chassis (2) includes anchorage for the Battery (28) and Battery Strap (29), as well as for an optional Unit PowerDrive (30).

### 3.6 Chassis Preferred Embodiment

The preferred embodiment of the Chassis (2) is an assembly consisting of a Cast Rear Chassis (31), Cast Receiver (32) and a pair of Legs (27a). Aluminum castings are preferred and legs may be either aluminum or steel of thinner wall, as parts and assembly costs dictate. Attachment of the castings to the legs may be via welding, riveting, crimping, etc.. A related means of attaching the Cast rear Chassis (31) to the Legs (27a) is to use the Rear Axles (39) as fasteners.

The 1 piece Cast Rear Chassis (31) contains the Pivot Point (14), Struts (33), Axle Mounts (34), Rear Crossmember (25), Foot Pad (26), Rear Leg Receivers (35), and Rear Battery Support (36).

The 1 piece Cast Receiver (32) contains the Receiver (23), Mid Leg Receivers (37), and Front Battery Support (38).

### 3.7 Front Wheels

Front Wheels (3a) can be Casters (3c), Rollers (3d), Ball Casters (3e), Glides (3f), Feet (3g), or a combination of the above. The "Stemless Caster" (3j) is a unique case wherein castering is effected via a structure that does not exceed the height of the wheel, unlike conventional casters. However, brakes (of the rotating/cam lock variety, among others) can easily be added.

The Front Wheels (3a) are mounted at either the distal end of the Legs (27a) or of the Leg Extensions (27b). The overall height of the combination is sufficiently low such that the entire assembly resides under the Platform (4) when it is fully lowered. If larger diameter Front Wheels are required (such as for navigating outdoors over rough terrain), the axles can be extended such that the track (or center to center distance between the planes of the wheels) is wider than the platform. These axles can also support casters at their outboard ends.

The Leg Extensions (27b) can be square and have a different type of front wheel on adjacent or opposing faces, such that removal, reorientation, and reinsertion can place an alternate "front wheel" in contact with the supporting surface.

Positionable Leg Extensions (27c) can be spring loaded inward and detented, such that a pull, twist, and release action can bring another "front wheel" type into play.

### 3.8 Rear Wheels

The preferred embodiment of the Rear Wheels (3b) is a semi-pneumatic rubber tire mounted on a rigid lightweight wheel containing ball bearings.

Outer wheel hubs are typically flush or below the outer plane of the tires to avoid damage to walls and door jambs.

Tires are typically of a "low bounce", high traction material to improve control (particularly when descending stairs), and improve the stability of the Unit when the brakes are applied, respectively.

The Rear Wheels (3b) are typically large (12-14" in diameter) such that the Unit can more readily traverse obstacles such as bumps and stairs even when loaded.

The Rear Wheels (3b) can have their footprint increased dramatically with the installation of Rear Wheel Collars (3h), as may be required when traversing soft surfaces (such as grass, sand, or loose soil) with the Unit heavily loaded.

### 3.9 Platform

The Platform (4) is the typical load supporting surface, though it is removable which will expose the Lifting Forks (40) to which it is mounted.

The Platform (4) can be either a simple single piece or a more advanced multi-piece design, such as that which is required to effect a Vise (42).

The Vise (42) employs a moveable Nosepiece (41a) which may be bevelled on its leading edge to aid in slipping the platform under a load such as a cardboard box, while V-grooved on the opposing surface to act as a jaw and aid in locating and capturing round stock. The Platform Body (41b) features a mirror image of the jaw of the Nosepiece (41a), and may also contain a Hole Pattern (41c) which can accept a variety of plug-in fitments. Work Clamps (41d) and a Trash Can Ring (41e) are but 2 examples.

It is intended that the Platform (4) with Vise (42) and Hole Pattern (41c) and Work Clamps (41d), when raised to a convenient height and with the Unit's brakes locked, provide equivalent functions of a portable worktable. The Multipurpose Lifting Tool, however, affords the user the added convenience of easily and infinitely adjusting worksurface height, the ease of transporting to and from the worksite, and the elimination of (un)folding legs.

The actuation of the Vise (42) would typically be manual, using either a foldable recessed hand crank, or using the Unit's Handcrank Backup (43) on a Hex (44) to actuate the vise's means of clamping the workpiece.

It is also the intent of the Nosepiece (41a) that it be used as a variable extension of the Platform (4) when lifting needs dictate, as in the case of having to move an air conditioner over a window sill when the front wheels are in contact with an interior wall. In this case, the Unit can be counterbalanced by one user (by stepping on the Foot Pad (26)) while another slides the air conditioner off of the Nosepiece (41a) without fear that the overhanging mass will inadvertently tip the unit forward.

It has also been considered that the Lifting Forks (40) may provide the locating surfaces for the moveable Nosepiece (41a) as well as the Platform Body (41b), thus reducing parts count (vs. a typical worktable vise) which requires support rods which serve only one purpose.

Another feature of the Platform (4) is that it be of sufficient rigidity such that Load Straps (15) can be sufficiently anchored and tensioned in a variety of locations, preferably anywhere around the entire perimeter of the platform. Thought has been given however, to flush mounting one or more Ratcheting Tie Down (45) stations with additional reinforcement for more severe requirements.

Additional fitments that may utilize the Hole Pattern (41c) of the Nosepiece (41a) and Platform Body (41b) are a Toolbox (46) and Compartment Box (47) which are stackable and can interlock to each other as well, utilizing the same pattern. Riser Frames (59) may be particularly helpful in extracting and replacing rear seats of SUV's where the space between the vehicle's seat belt attachments and adjusters coupled with the depth (to clear the rear bumper) required to pick the seat make this a challenge.

The Lifting Forks (40), Nosepiece (41a), and Platform Body (41b) are sufficiently narrow across their features such that the underside of this assembly, when at the bottom of its travel, nests between the Legs (27) thereby maintaining the low profile of the Unit's platform.

### 3.10 Handlebar

The Handlebar (5) is primarily used to steer, push or pull the Unit. Handgrips (48) assist the operator with this by providing a more secure and comfortable gripping surface.

Thumb Activated Controls (49) rotate about the Handlebar (5) and are used to raise and lower the Carriage (6) (with the right thumb), or to (with the left thumb) drive the Unit forward or backward utilizing the optional Unit Power Drive (30).

### 3.11 Carriage

The primary function of the Carriage (6) is to lift the Platform (4) when driven by the Drivetrain (7). It is comprised of the Rear Carriage Bearings (50), Front Carriage Slide (51), and Lifting Forks (40), and Front Carriage Bearings (65).

When the Platform (4) is in the full down position, the centerline of the axis of attachment of the Lifting Forks (40) to the Rear Carriage Bearings (50) coincides with the Pivot Point (14). When the Unit is folded (about Pivot Point (14)), the Front Carriage Slide (51) remains with the Column (1) and disengages from the Lifting Forks (40). This permits the Unit to fold easily with the Column (1) ultimately retaining the disengaged Platform (4) when the Column (1) is latched in the Down position.

The Front Carriage Slide (51) resides in the Column (1), has Teeth (55) which engage the Leadscrew (18), and a Fork (56) which engages the Lifting Forks (40)..

The Lifting Forks (40) may be tubular, with a Bushing (69) to support Vise Rods (88), or alternately, Extruded Forks (71) which can have an integral support for the Vise Rods (68). The Extruded Forks may have geometry such that a Sliding Ratcheting Tie Down (70) can be used at the location(s) and in the quantity required anywhere along the length of the Extruded Fork (70).

### 3.12 Drivetrain

The primary function of the Drivetrain (7) is to provide the force necessary to lift the loaded Platform (4) and maintain it in its elevated position.

The principal elements of the Drivetrain (7) are the Motor (52), Electric Brake (53), Gear Reduction (54), Leadscrew (18), Leadscrew Sleeve (17), and Leadscrew Bearing (19).

The preferred embodiment of the Drivetrain (7) is a rolled thread Leadscrew (18) driving high strength polymer Teeth (55) similar to a garage door opener trolley such as manufactured currently by Chamberlain. The Leadscrew Sleeve (17) provides continuous low friction support along the length of the Leadscrew (18) as required to preclude buckling of the Leadscrew (18) when compressively loaded, but without unnecessarily increasing (due to friction) the power required to do so.

The electric Motor (52) is a DC type with dynamic braking via shunting which occurs upon motor turnoff and additionally, an electromagnetic Brake (53) which similarly engages upon Motor (52) turnoff, both for the purpose of preventing the Carriage (6) from coasting or falling. The Gear Reduction (54) is employed to both match the speed of the typically available Motor (52) to the desired Carriage (6) speed as well as to increase the available lifting force.

Gear Reduction (54) is used generically and can actually be timing pulleys with belt, or spur gears, or a worm and helical gear combination, etc.. Gear Reduction (54) can also provide anti-back-drive capability, can be equipped with a mechanical lock, and can include a shock absorbing coupler,

such as a Lovejoy, such that damage to the drivetrain is prevented should a user transport considerable load (in an elevated position) with the Unit over rough terrain.

The Drivetrain (7) is typically powered from a Battery (28) of, for example, a rechargeable sealed lead acid type, such that the unit is essentially self-contained.

In the event, however, that a user wishes to lift a load and the Battery (28) is discharged or defective, a Handcrank Backup (43) is provided such that the task can be completed independent of available power.

### 3.13 Column Support

See Column and description of Latching Link (24).

The Latching Link (24) is so named because of its ability to latch securely in the extended position, which occurs with the Column (1) Up and when the Column (1) is Down. In both cases, the ability of the Unit to function (lifting or towing, respectively) is highly dependent on this capability.

The preferred embodiment of this linkage is one where the toggle action provides sufficient load and detenting such that the strength of the Lifting Forks (40) or the Column (1) is the limiting factor of the unit's capacity and not the Latching Link (24). The preferred embodiment of the latch feature is that it provides a highly visible indication as to whether it is securely latched or not.

As a redundant means of securing the Column (1) in the Up position, a Hitch Pin (57) which passes through the Receiver (23) and Column (1) can be provided.

### 3.14 Brake Mechanism

A Brake Mechanism (9) is intended to improve the ability of the user to safely regulate the movement of the Unit in a variety of conditions. Activated by a squeeze type Hand Lever (60), similar to a motorcycle control, the Brake Mechanism (9) allows the user to tip the Unit back, or back down, without using the Foot Pad (26) thereby allowing him or her to possibly maintain their balance via both feet on the ground. It permits one to descend stairs at a regulated speed with the ability to immediately stop the unit as it lands on the next stair tread, and it is obviously helpful descending hills.

The Brake Mechanism (9) also has a Parking Brake Feature (58) which is useful not only for maintaining the placement of the unit on inclined surfaces such as hills or garage floors with pitch, but also for providing the stability necessary to emulate the legs of a worktable.

The preferred embodiment of the Brake Mechanism (9) is a Hand Lever (60) actuated Pull Rod (61) which resides in the Brake Rod Shroud (22) area of the Column (1). Tension in this rod actuates the Brakes (62) regardless of whether the Unit is Up or Down. In this manner, the Brakes (62) can also be used to assist with safe storage (folded but stored vertically) or towing (such as up stairs or hills).

### 3.15 Controls

See Column, and description of Latching Link (24).

See Column Support, and description of Latching Link (24).

See Handlebar, and description of Thumb Activated Controls (49).

See Brake Mechanism, and description of Hand Lever (60).

Additionally, it is preferred that a Headlight Pod (63) cap the Column (1) such that the user can take advantage of the on-board power to improve visibility and therefore safety at night.

It is anticipated that the Headlight (64) be rotatably mounted, and/or with a wide dispersion optic such that the forward view is illuminated whether the Unit is on all wheels or is tipped back. It is also anticipated that the Headlight (64) could be removable, either on a coiled cord or with its own rechargeable battery pack, such that it may serve as a service or trouble light.

### 3.16 Other Features

It is anticipated that, given the ease with which this Unit can be moved or transported, and the fact that an on-board power source is accessible, that it can, consistent with its use as a multipurpose device, accept any practical and/or related fitment or battery powered tool. It can also be used to charge the battery of a powertool, via receptacle or cord, etc..

The Unit PowerDrive (30) may be multi or variable speed. For example, when driving forward, walking speed would typically necessary to move trash cans up an incline. However, when going up stairs with a load in reverse, a very low speed would be most practical.

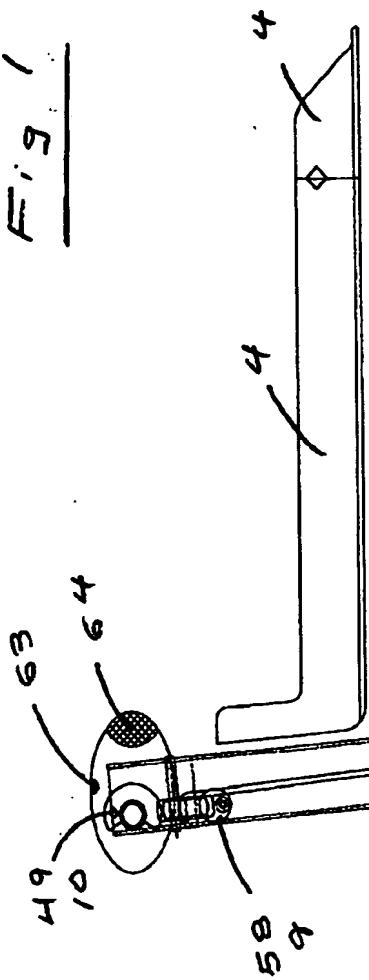
Further examples of the flexibility of the unit include using the Column (1) and Lifting Forks (40) to mount and drive a Cherry Picker (67) type hoist, using the Battery (28) to power hand tools or a winch via a receptacle, using the Battery (28) to power any of the features contained in a portable power station such as jumper cables or air compressor.

The unit may also include a Tip Alarm, which would either alert the user audibly, or prevent a lift, or both, if the unit is tipped beyond a point where a lift could occur safely. The unit may contain a clutch that audibly, such as by clicking like a locking gas cap, overruns in the event the platform force exceeds a specified amount in the down direction, to prevent a person's foot from being crushed, for example. The platform may contain a lock which only allows the column to fold relative to it when it is in the fully down direction, which may offer additional stability in some circumstances.

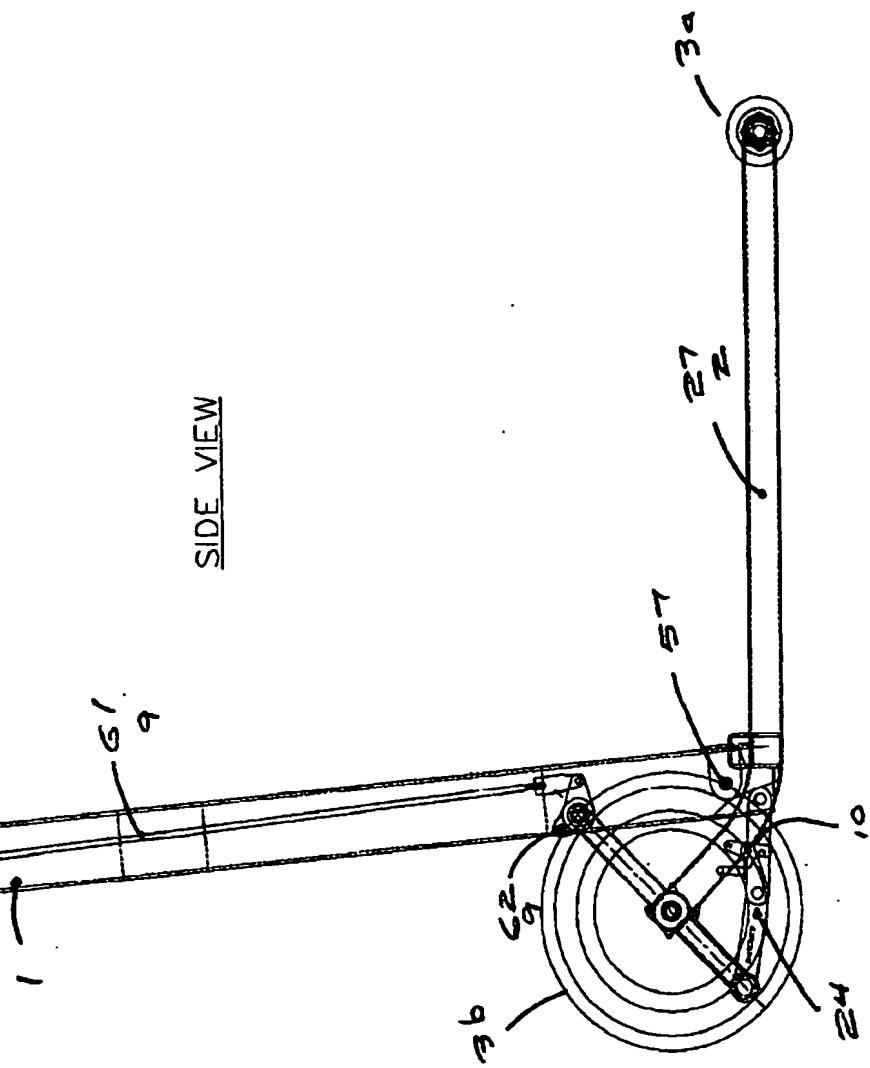
## 4.0 Figures and Views

- 4.1 Fig. 1 Side and Partial Project Views of Multipurpose Lifting Device (Unit)
- 4.2 Fig. 2 Side, Front, & Top Views of Unit in Down Position: Stored Horizontally
- 4.3 Fig. 3 Side Views of Folded Unit; Stored Horizontally or Vertically
- 4.4 Fig. 4 Side Views of Unit; Platform Up and Platform Down
- 4.5 Fig. 5 Isometric Sketch of Chassis, Castings, Battery, Battery Strap
- 4.6 Fig. 6 Isometric Sketch of Carriage, Platform, Column Section
- 4.7 Fig. 7 Isometric Sketch of Drivetrain, Column
- 4.8 Fig. 8 Isometric Sketches of Accessories: Work Clamps, Trash Can Ring, Tool Box, Compartment Box
- 4.9 Fig. 9 Isometric Sketch of Accessory: Riser Frame for SUV Seat, Firewood, etc.
- 4.10 Fig. 10 Isometric Sketches of Accessories: Arms, Cherry Picker, Unit PowerDrive
- 4.11 Fig. 11 Isometric Sketches of Front Wheel/Caster Options, Incl. Multi Position
- 4.12 Fig. 12 Side Section View of "Stemless" Caster
- 4.13 Fig. 13 Isometric Sketches of (Rear) Wheel Collar

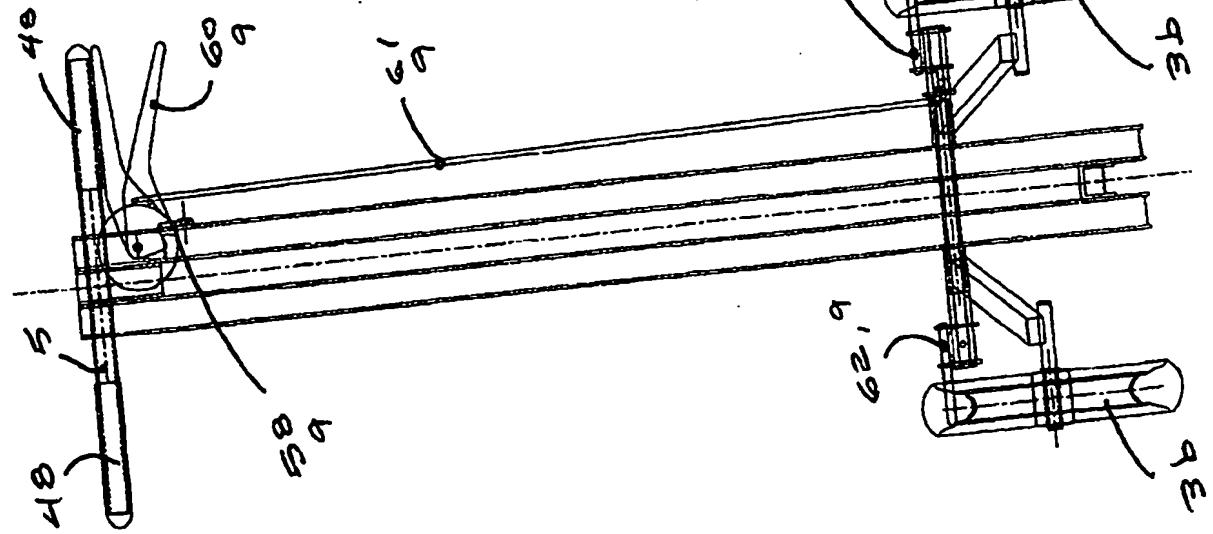
Fig. 1

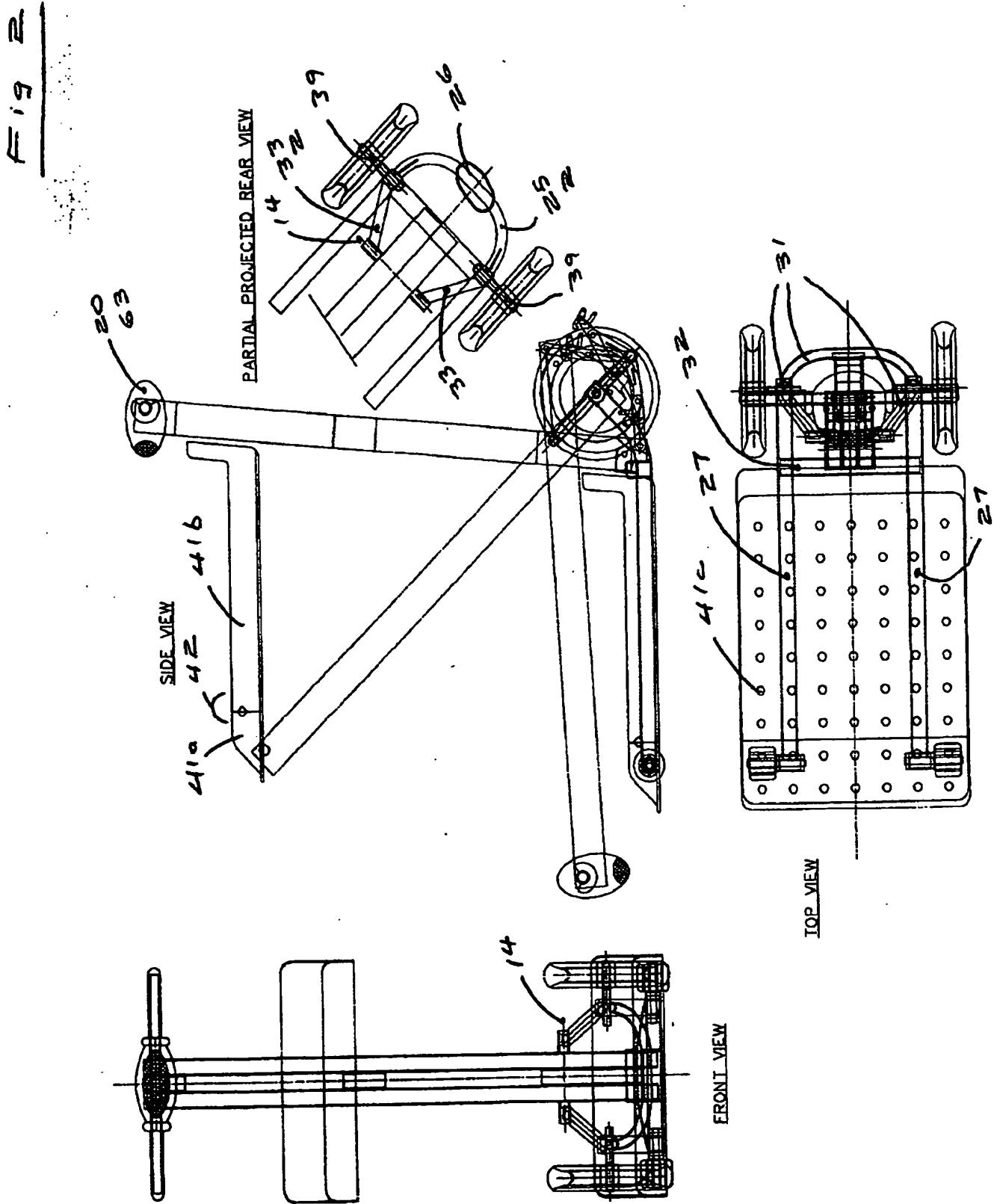


SIDE VIEW



PARTIAL PROJECTED REAR VIEW





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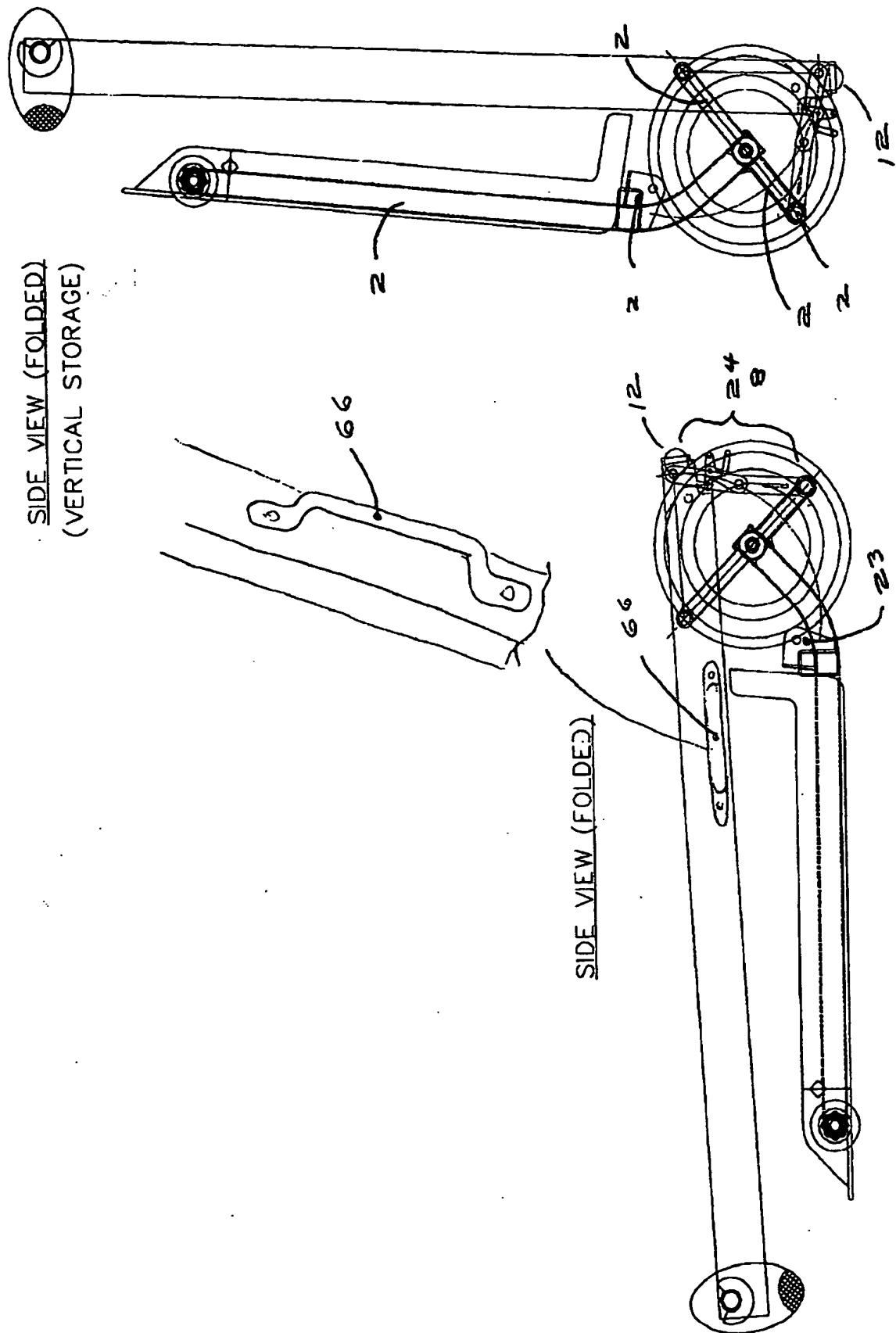


Fig 3

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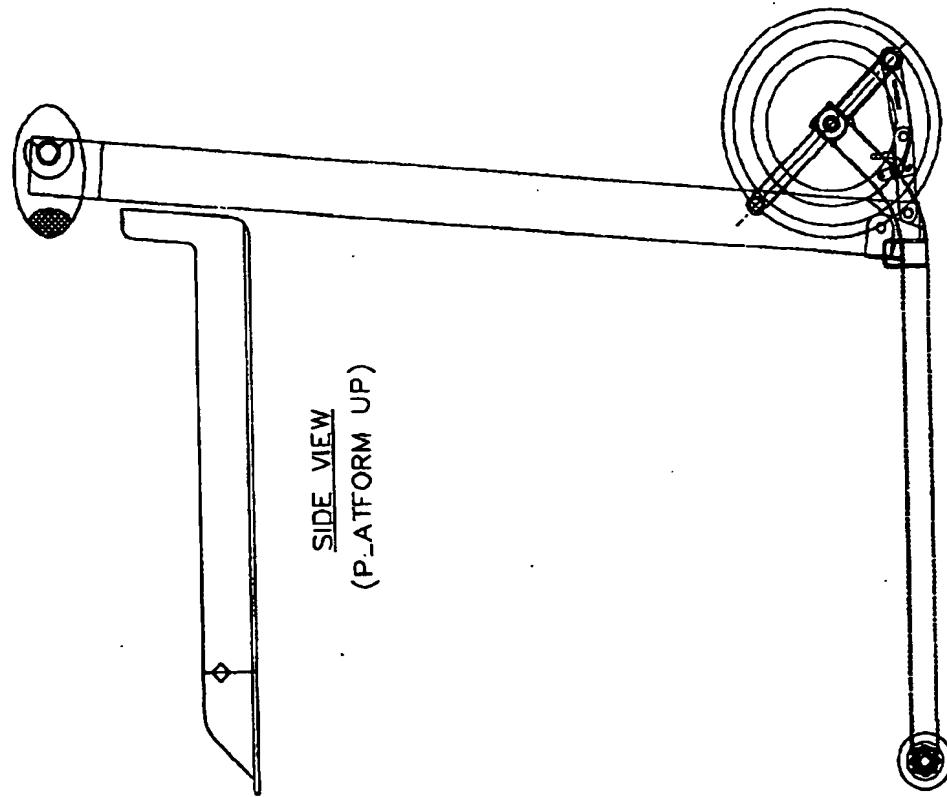
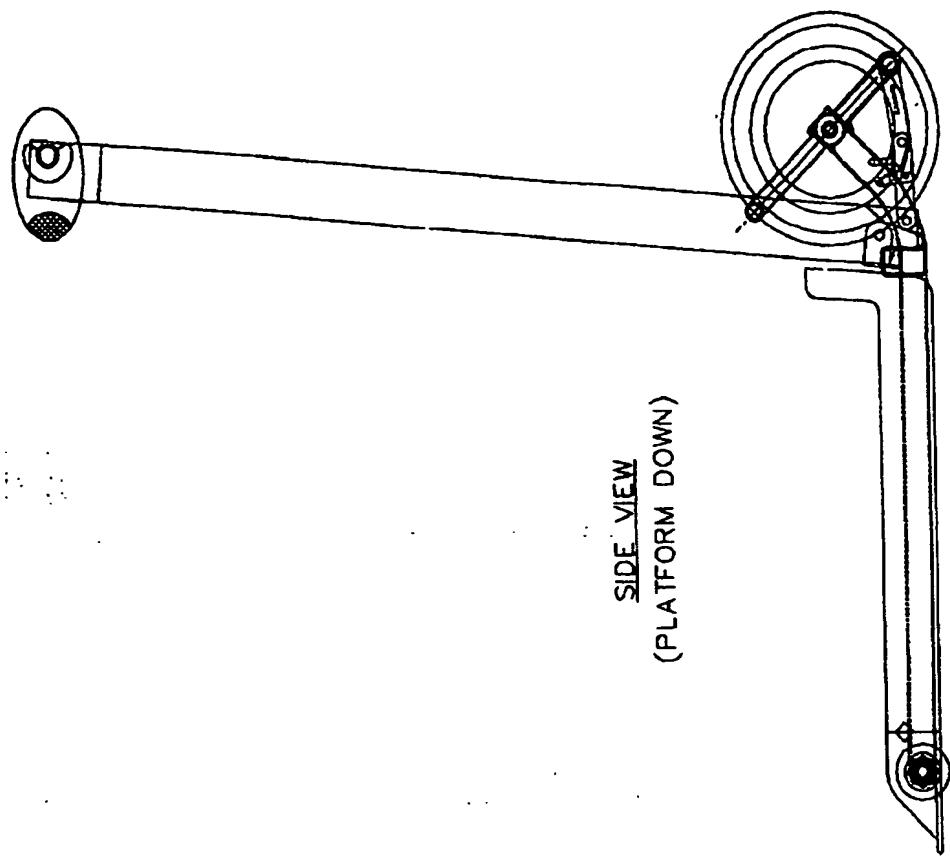
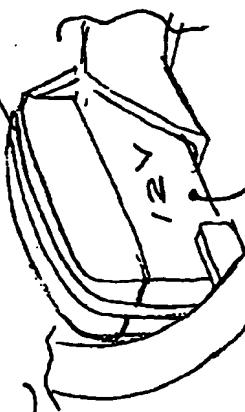


Fig 4

Fig 5

CHASSIS  
CONSTRUCTION

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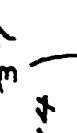


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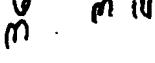
32



27b

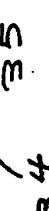


36



25

26

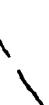


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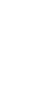
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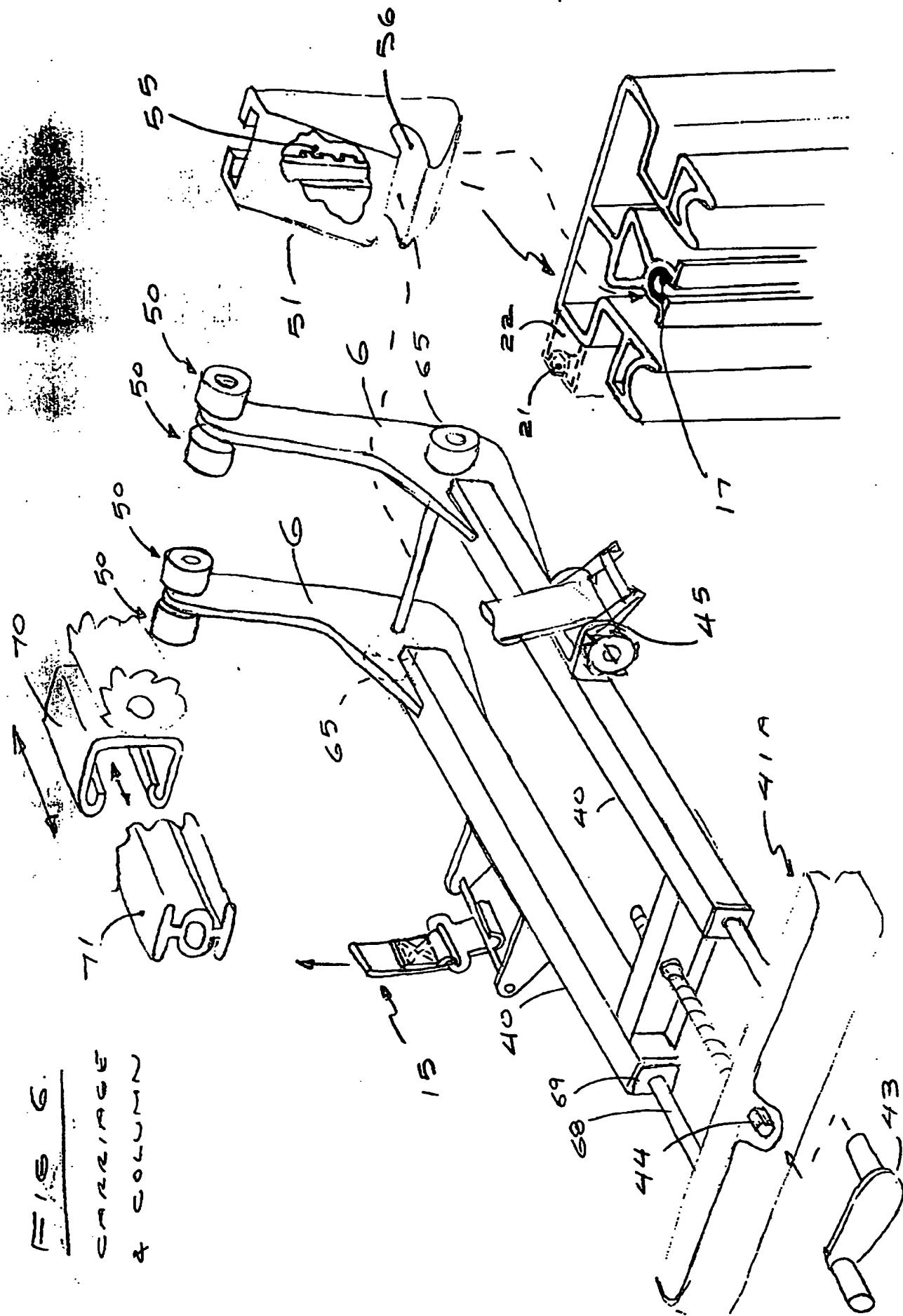
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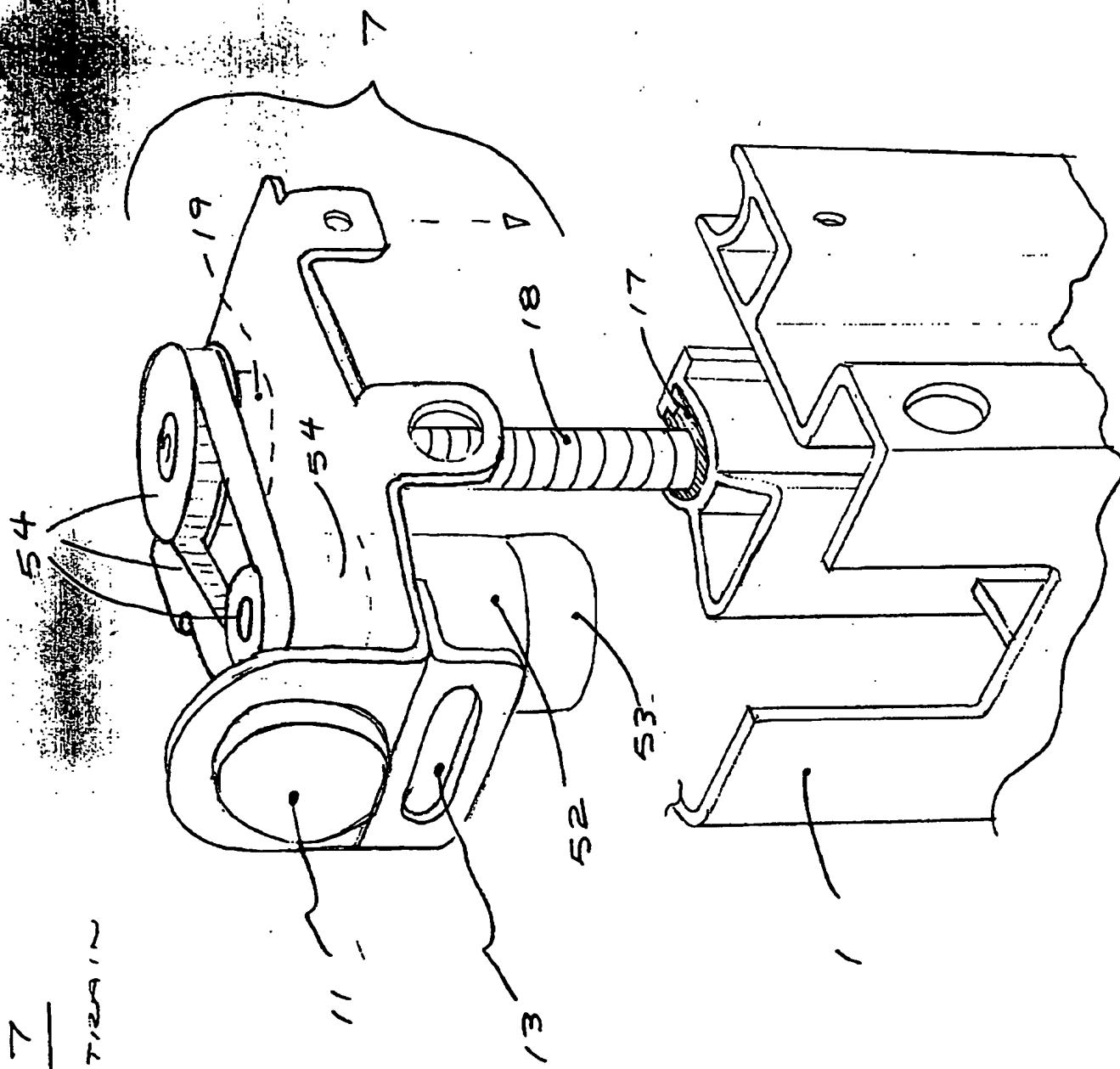


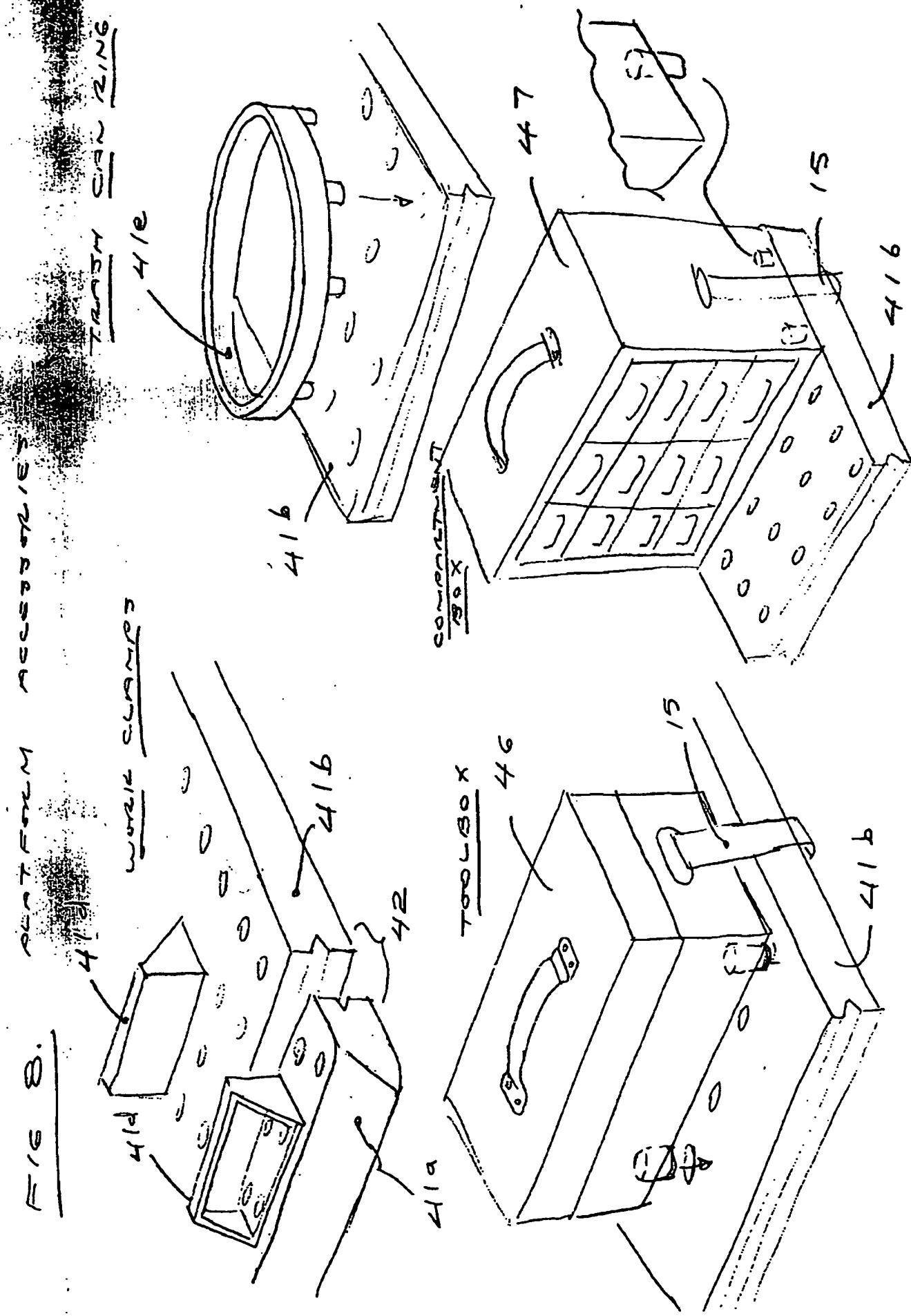
27ax



27o







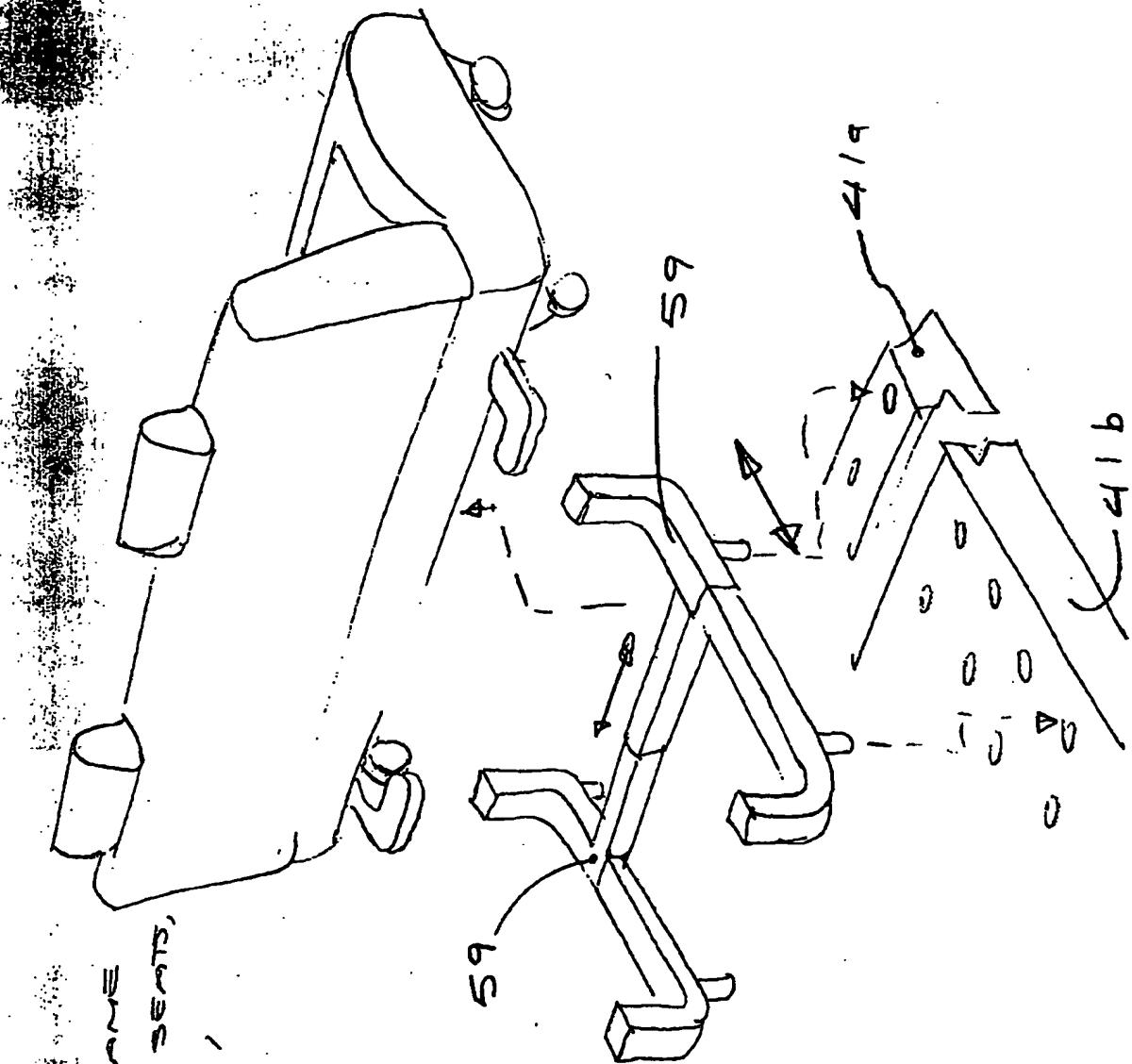
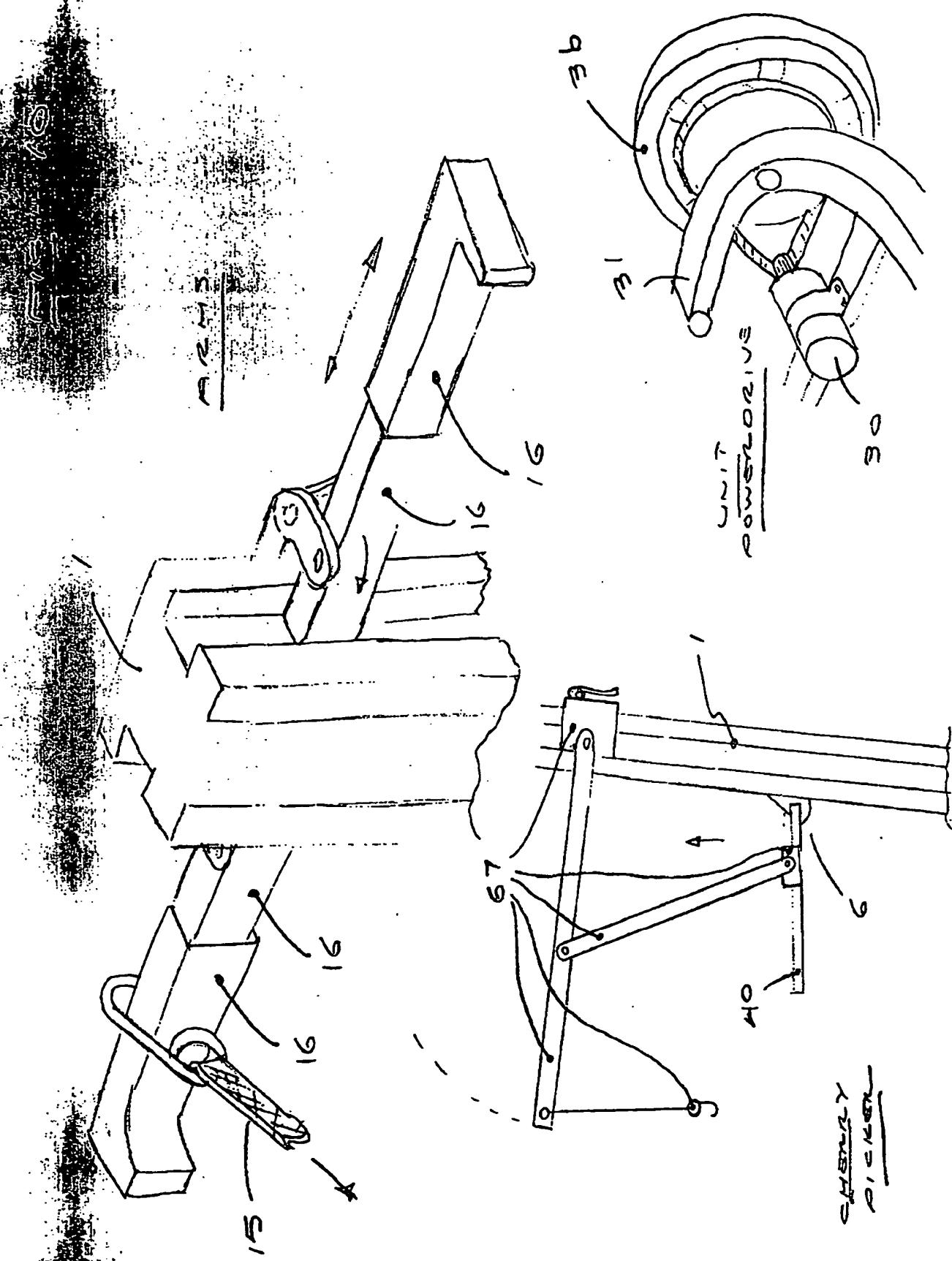
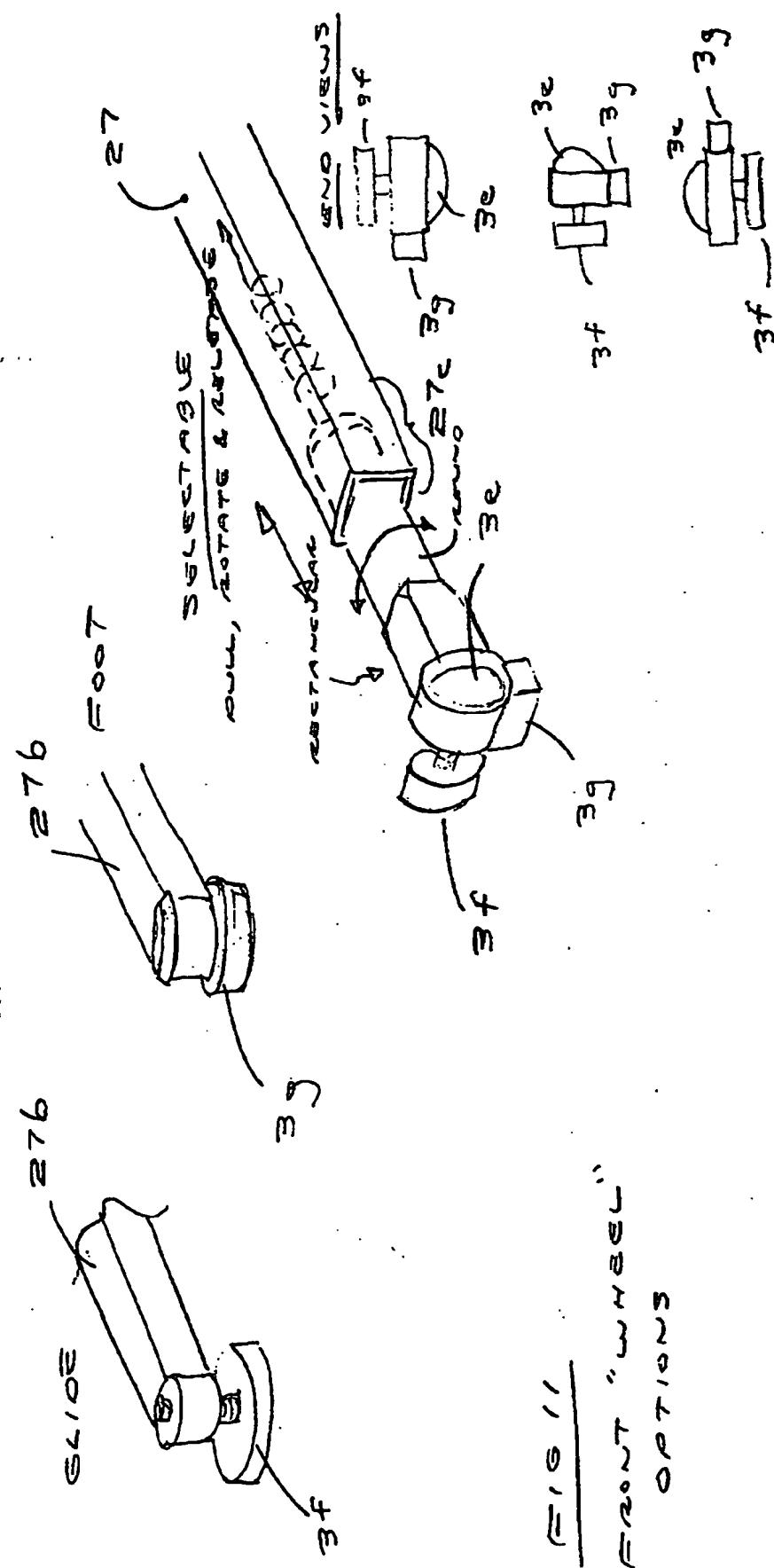
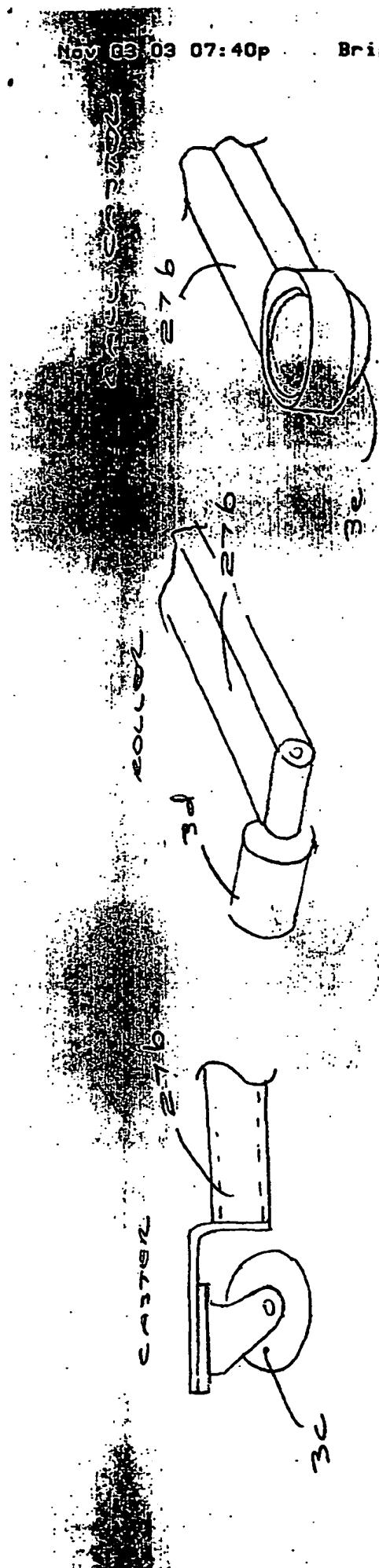
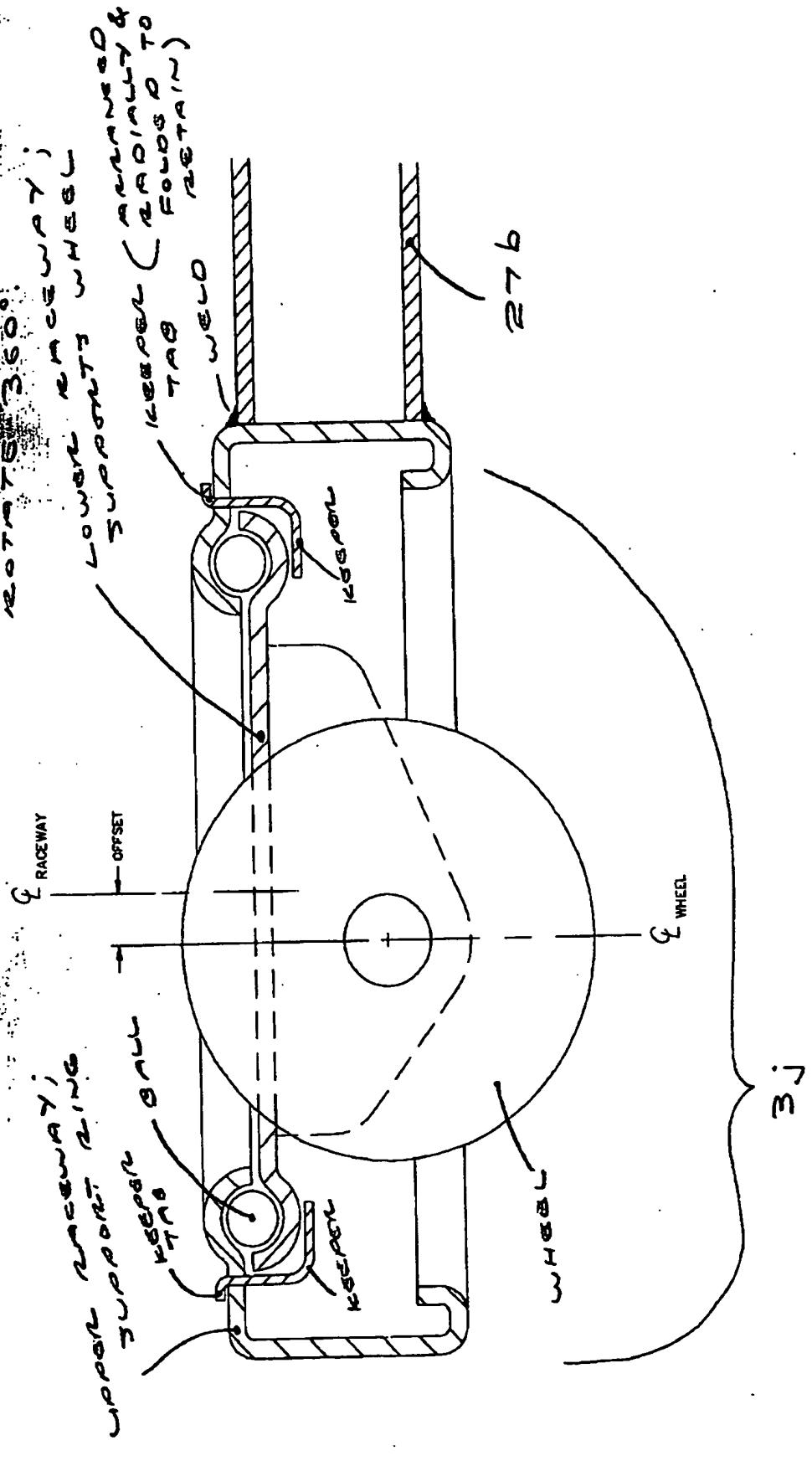


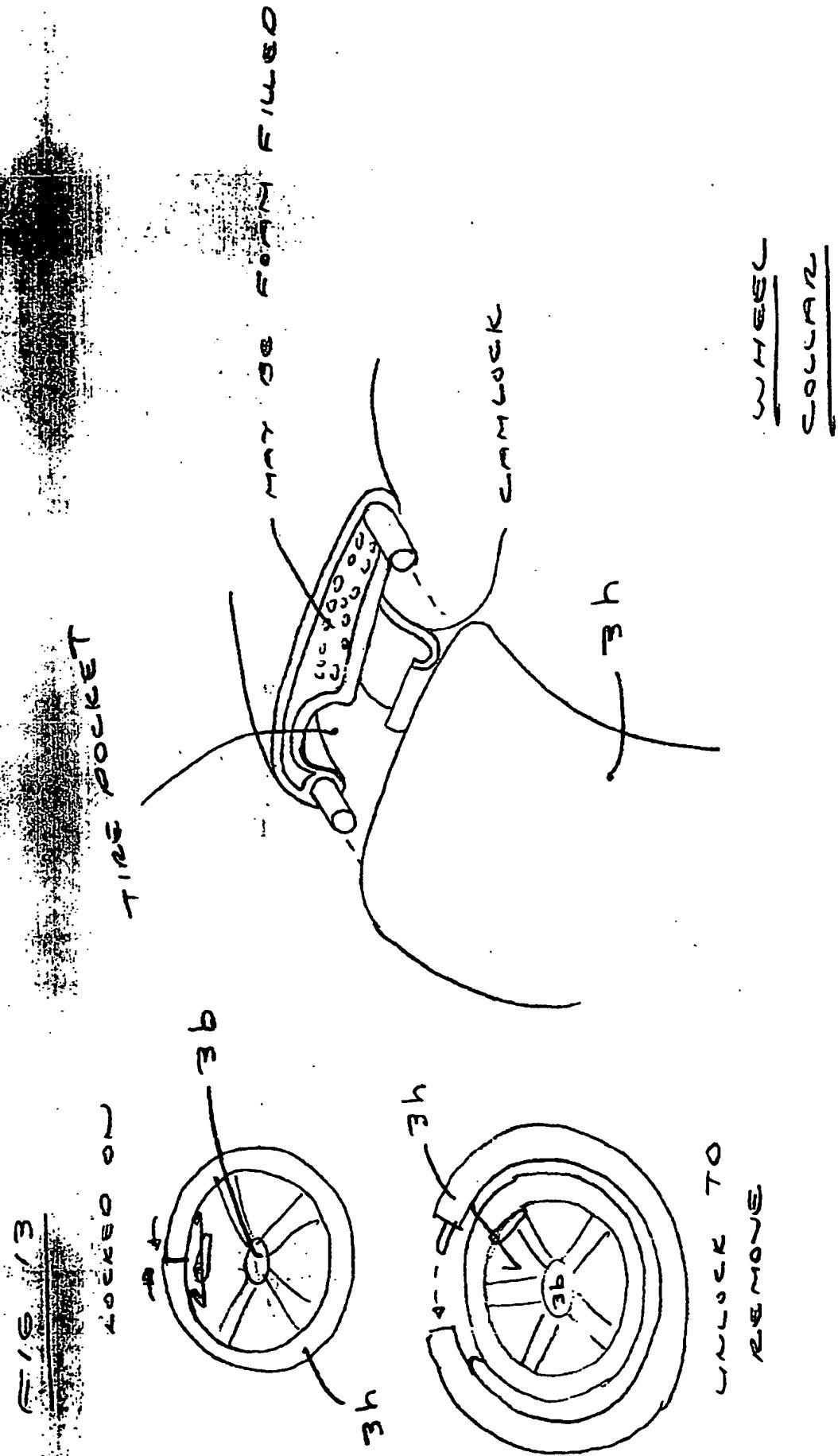
Fig. 2  
a) some features  
are shown,  
b) some  
etc.





Chloroform and carbon tetrachloride are the best solvents for the precipitation of the protein.





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